PRACTICE PAPER – V

MATHEMATICS

1. The number of surjections from A = {1, 2, ...n}, $n \geq 2$ onto B = (a,b) is
   (a) ${}^nP_2$ (b) $2^n - 1$
   (c) $2^n + 1$ (d) none of these

2. Set A has 3 elemets and set B has 4 elements. The number of injections that can be defined from A to B is
   (a) 144 (b) 12
   (c) 24 (d) 64

3. f : R → R is a function defined by f(x) = 10x – 7. If g = f^{-1}, then g(x) =
   (a) $\frac{1}{10x-7}$ (b) $\frac{1}{10x+7}$
   (c) $\frac{x+7}{10}$ (d) $\frac{x-7}{10}$

4. The number of bijective functions from set A to itself when A contains 106 elements is
   (a) 106 (b) $(106)^2$
   (c) 106! (d) 2^{106}

5. f(x) = |sin x| has an inverse if its domain is
   (a) [0, π] (b) $\left[0, \frac{\pi}{2}\right]$
   (c) $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$ (d) none

6. If the area of the triangle formed by points z, iz and z + iz is 50 square units, then |z| is
   (a) 5 (b) 10
   (c) 15 (d) none of these

7. If area of triangle on plane turned by number z, ωz and z + ωz is $4\sqrt{3}$, then |z| is
   (a) 4 (b) 2
   (c) 6 (d) 3

8. The locus of point z satisfying $\text{Re}\left(\frac{1}{z}\right) = k$, when k is a non-real real number is
   (a) straight line
   (b) a circle
   (c) an ellipise
   (d) a hyperbola

9. The locus of point z satisfying Re $(z^2) = 0$ is
   (a) point of straight lines
   (b) circle
   (c) hyperbola
   (d) none of these

10. If a_1, a_2, a_3 are in G.P. with common ratio r, then value of $a_3 > 4a_2 - 3a_1$ holds if
    (a) $1 < r < 3$ (b) $-3 < r < -1$
    (c) $r > 3$ or $r < 1$ (d) none

11. Let a, b, c be in A.P. and |a| < 1, |b| < 1, |c| < 1.
    If $x = 1 + a + a^2 + \ldots\ldots \infty$
    $y = 1 + b + b^2 + \ldots\ldots \infty$
    $z = 1 + c + c^2 + \ldots\ldots \infty$
    Then x, y, z are in
    (a) A.P. (b) G.P
    (c) H.P (d) none

12. Let $S \subset (0, \pi)$ denotes set of values of x. If $8^{1+|\cos x|+\cos^2 x+|\cos^3 x|+\ldots\ldots\infty} = 4^3$, then S =
    (a) $\frac{\pi}{3}$ (b) $\left(\frac{\pi}{3}, \frac{2\pi}{3}\right)$
    (c) $\left(-\frac{\pi}{3}, \frac{2\pi}{3}\right)$ (d) $\left(\frac{\pi}{3}, \frac{2\pi}{3}\right)$

13. If $\log_x a$, $a^{x/2}$ and $\log_x b$ are in G.P. then x is equal to
    (a) $\log_a(\log_b a)$ (b) $\log_a(\log a)$
    (c) $-\log_a(\log_a b)$ (d) $\log b$

14. If $a \in z$, $(x - a)(x - 10) + 1 = 0$ has integral roots, then values of a are
    (a) 10, 8 (b) 12, 10
    (c) 12, 8 (d) none

15. If $(3x)^2 + (27 \times 3^{1/p} - 15)x + 4 = 0$ has equal roots, then p is equal to
    (a) 0 (b) 2
    (c) $-\frac{1}{2}$ (d) none

16. The value of a for which $(1 - 2a)x^2 - 6ax - 1 = 0$ and $ax^2 - x + 1 = 0$ have atleast one root, in common are
    (a) 0, $-\frac{1}{2}$ (b) $\frac{1}{2}, \frac{2}{9}$
    (c) $\frac{2}{9}$ (d) 0, $\frac{1}{2}, \frac{2}{9}$

17. There are m copies of each n different books in libaray. The number of ways in which one or more than one book can be selected as

(*a*) $m^n + 1$ (*b*) $(m + 1)^n - 1$

(*c*) $(n + 1)^n - m$ (*d*) m

18. The number of ways in which one or more balls can be selected out of 10 white, 9 green and 7 blues balls, is

(*a*) 892 (*b*) 881

(*c*) 891 (*d*) 879

19. The number of all 3 elements subsets of det $(a_1, a_2, a_3 .... a_n)$ which contains a_3 is

(*a*) ${}^nC_3$ (*b*) ${}^{n-1}C_3$

(*c*) ${}^{n-1}C_2$ (*d*) none of these

20. The number of terms which are free from redical signs in expansion $(y^{1/5} + x^{1/10})^{55}$ is

(*a*) 5 (*b*) 6

(*c*) 7 (*d*) none of these

21. If sum of coefficient of $(a + b)^n$ is 4096, then greatest coefficient is

(*a*) 924 (*b*) 792

(*c*) 1594 (*d*) none of these

22. 3rd term in the expansion of $\left(\frac{1}{x} + x^{\log_{10} x}\right)^5$, $x > 1$ is 1000, then x is

(*a*) 100 (*b*) 1000

(*c*) 1 (*d*) $\frac{1}{\sqrt{10}}$

23. If A is square matrix of order n, then adj (adj A) is equal to

(*a*) $|A|^n A$ (*b*) $|A|^{n-1} A$

(*c*) $|A|^{n-1} A$ (*d*) $|A|^{n-3} A$

24. If A is singular, then A adj A is matrix

(*a*) identify (*b*) null

(*c*) scalar (*d*) none of these

25. If $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ and $n \in N$, then A^n equals

(*a*) $2^n A$ (*b*) $2^{n-1} A$

(*c*) nA (*d*) none of these

26. If $\begin{vmatrix} x^n & x^{n+2} & x^{n+3} \\ y^n & y^{n+2} & y^{n+3} \\ z^n & z^{n+2} & z^{n+3} \end{vmatrix} = (x - y)(y - z)(z - x)\left(\frac{1}{x} + \frac{1}{y} + \frac{1}{z}\right)$, then n equals

(*a*) 1 (*b*) –1

(*c*) 2 (*d*) –2

27. The orthocenter of the triangle formed by lines xy = 0 and x + y = 1 is

(*a*) $\left(\frac{1}{2}, \frac{1}{2}\right)$ (*b*) $\left(\frac{1}{3}, \frac{1}{3}\right)$

(*c*) (0, 0) (*d*) $\left(\frac{1}{4}, \frac{1}{4}\right)$

28. The area of figure formed by $ax \pm by \pm c = 0$ is

(*a*) $\frac{c^2}{ab}$ (*b*) $\frac{2c^2}{ab}$

(*c*) $\frac{c^2}{2ab}$ (*d*) none of these

29. The equation $ax^2 + by^2 + cx + cy = 0$ represent pair of lines if

(*a*) c = 0 (*b*) a + b = 0

(*c*) c = 0 or a + b = 0 (*d*) none of these

30. If an equilatual triangle is inscribed in circle $x^2 + y^2 = a^2$, then length of each side is

(*a*) $\sqrt{2}a$ (*b*) $\frac{\sqrt{3}}{2}a$

(*c*) $\sqrt{3}a$ (*d*) none of these

31. The latus rectum of parabola whose focal chord is P S Q is such that SP = 3 and SQ = 2 is given by

(*a*) $\frac{24}{5}$ (*b*) $\frac{12}{5}$

(*c*) $\frac{6}{5}$ (*d*) none of these

32. Find c such that straight line y = 4x + c touches curve $\frac{x^2}{4} + y^2 = 1$ is

(*a*) 0 (*b*) 3

(*c*) 2 (*d*) Infinete

33. The eccentricity of the conic represented by $x^2 - y^2 - 4x + 4 + 4y + 16 = 0$ is

(*a*) 1 (*b*) $\sqrt{2}$

(*c*) 2 (*d*) $\frac{1}{2}$

34. If f(x + 2y, x – 2y) = xy, then f(x, y) equal

(*a*) $\frac{x^2 - y^2}{8}$ (*b*) $\frac{x^2 - y^2}{4}$

(*c*) $\frac{x^2 + y^2}{4}$ (*d*) $\frac{x^2 - y^2}{2}$

35. The period of $f(x) = \sin^4 x + \cos^4 x$ is

(*a*) π (*b*) $\frac{\pi}{2}$

(*c*) 2π (*d*) none of these

36. $\underset{x\to 0}{\text{Lt}} \frac{\sqrt{x^2+1}-1}{\sqrt{x^2+9}-3}$ is equal to

(*a*) 3 (*b*) 4

(*c*) 1 (*d*) 2

37. $\underset{x\to 0}{\text{Lt}} \left(\frac{x+5}{x-1}\right)^x$ is equal to

(*a*) e^6 (*b*) e^5

(*c*) e (*d*) 1

38. If $f(x) = \sin^{-1}\left(\frac{2x}{1+x^2}\right)$, then f(x) is differentiable on

(*a*) [–1, 1] (*b*) R – [–1, 1]

(*c*) R – (–1, 1) (*d*) none of these

39. If $f(x) = |x - a|\,\phi(x)$, where $\phi(x)$ is continuous, then

(*a*) $f'(a+) = \phi(a)$ (*b*) $f'(a) = -\phi(a)$

(*c*) $f'(a^+) = \phi'(a^{-1})$ (*d*) none of these

40. If $f(x) = \sqrt{x^2+9}$ then $\underset{x\to 4}{\text{Lt}} \frac{f(x)-f(4)}{x-5}$ equals

(*a*) $\frac{5}{4}$ (*b*) $-\frac{4}{5}$

(*c*) $\frac{4}{5}$ (*d*) none of these

41. If f(9) = 9 and f'(9) = 4, then $\underset{x\to 9}{\text{Lt}} \frac{\sqrt{f(x)}-3}{\sqrt{x}-3}$ equals

(*a*) 9 (*b*) 4

(*c*) 36 (*d*) none of these

42. $f(x) = \frac{x}{\log x}$ increase in the interval

(*a*) $(0, \infty)$ (*b*) (0, e)

(*c*) (e, ∞) (*d*) none of these

43. The maximum area of reactangle that can be inscribed in a circle of radius r is

(*a*) πr^2 (*b*) r^2

(*c*) $\frac{\pi r^2}{4}$ (*d*) $2r^2$

44. $\int \frac{\cos 2x}{\cos x} dx$ is equal to

(*a*) $2 \sin x + \log(\sec x - \tan x) + c$

(*b*) $\sin x$

(*c*) $\tan x$

(*d*) $2 \sin x - \log(\sec x + \tan x) + c$

45. $\int \frac{1}{x(x^n+1)} dx$ equals

(*a*) $\frac{1}{n}\log\left(\frac{x^n}{x^n+1}\right)+c$ (*b*) $\frac{1}{n}\log\left(\frac{x^n+1}{x^n}\right)$

(*c*) $\log\left(\frac{x^n}{x^n+1}\right)+c$ (*d*) none of these

PHYSICS

46. The fact that light of transverse wave derives its evidence by the support from the observation that

(*a*) light waves undergo reflection

(*b*) light can be diffracted

(*c*) light travels in waves

(*d*) light shows polarizing effects

47. In a transverse progressive wave of amplitude A, the maximum particle velocity is four times its 'wave velocity, then the wavelength of the wave is

(*a*) $2\pi A$

(*b*) πA

(*c*) $\frac{\pi A}{2}$

(*d*) $\frac{\pi A}{4}$

48. If the coefficient of cubical expansion is x times of the coefficient of superficial expansion, then value of x is

(*a*) 3 (*b*) 2.5

(*c*) 1.5 (*d*) 2

49. A body weighs 700 N on earth. What will be its weight in a planet having $\frac{1}{7}$ th of earth's mass and half of earth's radius ?

(*a*) 400N (*b*) 300N

(*c*) 200 N (*d*) 100 N

50. A man fires a bullet standing between two cliffs. First echo is heard after 3 second and second echo is heard after 5 second. If the velocity of sound is 330 m/s. Then the distance between cliffs is

(*a*) 660 m (*b*) 990 m

(*c*) 1320 m (*d*) 1950 m

51. Find the total displacement of a body in 8 second starting from rest with an acceleration of 20 cm/sec^2
(*a*) 64 m (*b*) 64 cm
(*c*) 640 cm (*d*) 0.064 m

52. If a planet consists of a satellite whose mass and radius are both half that of earth. Acceleration due to gravity (g) at its surface should be
(*a*) 29.4 m/sec^2 (*b*) 19.6 m/sec^2
(*c*) 9.8 m/sec^2 (*d*) 4.9 m/sec^2

53. Speed of a ball of 2 cm radius in a viscous liquid is 20 cm/sec. Then the speed of 1 cm radius of ball in the same liquid is
(*a*) 80 cm/s (*b*) 40 m/s
(*c*) 10 cm/s (*d*) 5 cm/s

54. A source and an observer move away from each other, with a velocity of 10 m/s with respect to ground. If the observer finds the frequency of sound coming from the source as 1950 Hz. Then actual frequency of the source is (velocity of sound in air = 340 m/s)
(*a*) 2486 Hz (*b*) 2132 Hz
(*c*) 2068 Hz (*d*) 1950 Hz

55. Masses of three wires of copper are in the ratio of 1 : 3 : 5 and their length are in the ratio of 5 : 3 : 1. The ratio of their electrical resistance is
(*a*) 125 : 15 : 1 (*b*) 1 : 15 : 125
(*c*) 5 : 3 : 1 (*d*) 1 : 3 : 5

56. At a certain place, the horizontal component of earth's magnetic field is. $\sqrt{3}$ times of its vertical component, the angle of dip at that place is
(*a*) 75° (*b*) 60°
(*c*) 45° (*d*) 30°

57. A hollow sphere filled with water forms the bob of a simple pendulum. A small hole at the bottom of the bob allows the water to slowly flow out as it is set into small oscillation and its period of oscillation is measured. The time period will
(*a*) first increase then decrease
(*b*) remains constant
(*c*) decrease
(*d*) increase

58. A body of mass a moving with a velocity b strikes a body of mass c and gets embebded into it. The velocity of the system after collision is
(*a*) $\frac{a+c}{ab}$ (*b*) $\frac{ab}{a+c}$
(*c*) $\frac{a}{b+c}$ (*d*) $\frac{a}{a+b}$

59. The speed of a boat is 5 km/hour in still water. If it crosses a river of width 1 km along the shortest possible path in 15 minutes, then velocity of the river's water is
(*a*) 1 km/hour (*b*) 2 km/hour
(*c*) 3 km/hour (*d*) 4 km/hour

60. The moment of inertia of a regular circular disc of mass 0.4 kg and radius 100 cm about the axis perpendicular to the plane of the disc and passing through its centre is
(*a*) 0.002 kg-m^2 (*b*) 0.02 kg-m^2
(*c*) 2 kg-m^2 (*d*) 0.2 kg-m^2

61. The angular velocity of second's hand in a watch is
(*a*) 0.82 rad/sec (*b*) 0.105 rad/sec
(*c*) 0.21 rad/sec (*d*) 0.052 rad/sec

62. A body radiates 5 W energy at a temperature of 400 K. If the temperature is increased to 1200 K, then it radiates energy at the rate of
(*a*) 419 W (*b*) 405 W
(*c*) 210 W (*d*) 80 W

63. Assuming earth to be a sphere of a uniform density. What is the value of gravitational acceleration in a mine 100 km below the earth's surface? (given R = 6400 k/m)
(*a*) 3.9 m/s^2 (*b*) 9.65 m/s^2
(*c*) 7.75 m/s^2 (*d*) 5.25 m/s^2

64. A substance reduces to $\frac{1}{6}$ th of its original mass in 2 hours. The half life period of the substance will be
(*a*) 30 min. (*b*) 90 min.
(*c*) 45 min. (*d*) 60 min.

65. A block of mass 60 kg just slides over a horizontal distance of 0.9 m. If the coefficient of friction between their surfaces is 0.15 then work done against friction will be
(*a*) 79.4 J (*b*) 97.54 J
(*c*) 105.25 J (*d*) none of these

66. The mass of two substances are 25 g and 81 g respectively. If their kinetic energies are same then their ratio of their moments is

(*a*) 9 : 5 (*b*) 7 : 3

(*c*) 5 : 9 (*d*) none of these

67. The speed of a wave in a medium is 650 m/s. If 4000 waves are passing through a point, in the medium in 1.67 minute, then its wavelength will be

(*a*) 25.16 m (*b*) 16.25 m

(*c*) 32.50 m (*d*) 8.25 m

68. Bernoulli's theorem is based on

(*a*) conservation of mass energy and momentum

(*b*) conservation of momentum

(*c*) conservation of mass

(*d*) conservation of energy

69. A smooth inclined plane of length L having inclination θ with the horizontal is inside a lift which is moving down with a retardation a. The time taken by a body to slide down the inclined plane from rest will be

(*a*) $\sqrt{\frac{2L}{(g+a)\sin\theta}}$ (*b*) $\sqrt{\frac{2L}{(g-a)\sin\theta}}$

(*c*) $\sqrt{\frac{2L}{a\sin\theta}}$ (*d*) $\sqrt{\frac{2L}{g\sin\theta}}$

70. A block is moving up at $\theta = 30°$ with a velocity 5 m/s stops after 0.5 sec, then what is value of friction (μ) ?

(*a*) 0.6 (*b*) 0.5

(*c*) 1.25 (*d*) none of these

71. A planet of mass m moves around the sun of mass M in a elliptical orbit. The maximum and minimum distance of the planet from the sun are r_1 and r_2 respectively. The time period of the planet is proportional to

(*a*) $r_1^{2/5}$ (*b*) $(r_1 + r_2)^{3/2}$

(*c*) $(r_1 - r_2)^{3/2}$ (*d*) $r^{3/2}$

72. Let W be the work done, when a bubble of volume V is formed from a given solution. How much work is required to be done to form a bubble of volume 2V?

(*a*) $4^{1/3}$ W (*b*) $2^{1/3}$ W

(*c*) 2W (*d*) W

73. Two springs of spring constant 1500 N/m and 3000 N/m respectively are stretched with the same force. They will have the potential energies in the ratio of

(*a*) 1 : 2 (*b*) 1 : 4

(*c*) 4 : 1 (*d*) 2 : 1

74. The maximum energy in the thermal radiation from a heat source occurs at a wavelength of 11×10^{-5} cm. According to Wein's displacement law, the temperature of this source will be n times. The temperature of another source for which the wavelength at maximum energy is 5.5×10^{-5} cm. Then the value of n is

(*a*) $\frac{1}{2}$ (*b*) 1

(*c*) 2 (*d*) 4

75. Intensity of X-rays depends upon the number of

(*a*) positron (*b*) neutrons

(*c*) protons (*d*) electrons

76. At 27°C temperature the kinetic energy of an ideal gas is E_1. If the temperature is increased to 327°C then the kinetic energy will be

(*a*) $\frac{E_1}{\sqrt{2}}$ (*b*) $\sqrt{2}E_1$

(*c*) $2E_1$ (*d*) $\frac{E_1}{2}$

77. The planet which is called twin of earth is

(*a*) pluto (*b*) mass

(*c*) mercury (*d*) venus

78. A 5.5 metre length of string has a mass of 0.035 kg. If the tension in the string is 77 N. Then the speed of a wave on the string will be

(*a*) 102 m/s (*b*) 77 m/s

(*c*) 110 m/s (*d*) 150 m/s

79. When we touch the terminal of a high voltage capacitor, even after a high voltage has been cut-off. Then the capacitor has the tendency to

(*a*) affect dangerously

(*b*) discharge energy

(*c*) restore energy

(*d*) both (*a*) and (*b*)

80. The capacitor of capacitance 4μF and 6μF are connected in series. A potential difference of 500 volt is applied to the outer plates of two capacitor system. Then the charge on each plate of each capacitor is numerically
(*a*) 6000 μC (*b*) 1200 μC
(*c*) 12000 C (*d*) 6000 C

81. A 2Ω resistor is connected in series with RΩ resistor. This combination is connected across a cell. When the potential difference across 2Ω resistor is balanced on potentiometer wire, null point is obtained at a length of 300 cm when the same procedure is repeated for RΩ resistor, null point is obtained at the length of 350 cm, value of R is
(*a*) 5Ω (*b*) 3.33Ω
(*c*) 4.6Ω (*d*) 2.33Ω

82. The energy of an X-ray photon is 2 keV then the frequency is
(*a*) 3.2×10^{-6} (*b*) 5×10^{17}
(*c*) 2×10^{17} (*d*) 2×10^{18}

83. [illegible]
to 6[illegible]
(*a*) $\sin^{-1}$ [illegible]
(*c*) $\sin^{-1}(\tan\theta)$

84. The dispersive pow[illegible] [illegible] two lenses are in the ratio 3 : 4. If the achromatic combination of these two lenses is of focal length 60 cm, then the focal lengths of the component lenses are
(*a*) + 15 cm and – 20 cm
(*b*) – 15 cm and – 20 cm
(*c*) + 20 cm and – 25 cm
(*d*) – 20 cm and + 25 cm

85. A cyclotron is operating at a frequency of 12×10^6 Hz. Mass of deuteron is 3.3×10^{-27} kg and charge on deuteron is 1.6×10^{-19} coulomb. To accelerate deuterons the magnetic induction of the necessary magnetic field is
(*a*) 0.016 tesla (*b*) 0.16 tesla
(*c*) 16 tesla (*d*) 1.6 tesla

CHEMISTRY

86. One mole of an ideal gas is allowed to expand reversibly and adiabatically from a temperature of 27°C. The work done is 3 kJ. The final temperature of the gas is equal to [C_v = 20 kJ^{-1}]
(*a*) 75 K (*c*) 150 K
(*b*) 225 K (*d*) 300 K

87. The alcohol manufactured from water gas is
(*a*) ethanol (*b*) methanol
(*c*) isobutanol (*d*) butanol

88. A compound has C = 40%, H = 13.33% and N = 46.67%. The empirical formula is
(*a*) CH_4N (*b*) C_2H_5N
(*c*) CH_2N (*d*) CH_4N_2

89. The sulphide ore of copper is concentrated by
(*a*) chemical method
(*b*) froth floatation method
(*c*) magnetic method
(*d*) none of the above

90. Le-Chatelier's principle is applicable to
(*a*) heterogeneous reaction
(*b*) homogeneous reaction
(*c*) irreversible reaction
(*d*) system in equilibrium

91. Ammonia and sodium hypochlorite reacts to produce
(*a*) NH_2OH (*b*) NH_2NH_2
(*c*) N_2 (*d*) NO

92. One gm of oxygen at NTP occupies the volume
(*a*) 2.4 litre (*b*) 4.8 litre
(*c*) 1.4 litre (*d*) 1.2 litre

93. P_2O_5 is an anhydride of
(*a*) HPO_3 (*b*) H_3PO_4
(*c*) H_3PO_3 (*d*) $H_2P_2O_7$

94. Number of unpaired electrons in $1s^2$, $2s^2$ $2p^3$ is
(*a*) 1 (*b*) 2
(*c*) 3 (*d*) 4

95. Normality of 0.3 M H_3PO_4 solution is
(*a*) 0.3N (*b*) 0.4N
(*c*) 0.6N (*d*) 0.9N

96. When primary amine is heated with CS_2 in presence of excess of mercuric chloride, it produce isothiocyanate. This reaction is known as
(*a*) Hoffmann bromide reaction
(*b*) Carbylamine reaction
(*c*) Hoffmann mustard oil reaction
(*d*) Hinsberg's reaction

97. The law of equilibrium was first of all given by
(a) Boyle (b) Guldberg
(c) Waage (d) both (b) and (c)

98. Which the metal shows electrical conduction ?
(a) graphite (b) sodium
(c) potassium (d) diamond

99. On heating one end of a piece of metal, the other end becomes hot because of
(a) mobility of atoms in the metal
(b) resistance of the metal
(c) minor purturbation in the energy of the metal
(d) energised electrons moving to the other end

100. Nessler's reagent is used for the test of
(a) CO_3 (b) CO_2
(c) NH_4^+ (d) SO_4

101. Benzene on oxidation with V_2O_5 produce
(a) toluene (b) benzaldehyde
(c) benzoic acid (d) maleic anhydride

102. The most abundant metal in the earth's crust is
(a) Al (b) Na
(c) Ca (d) Fe

103. During electrolysis the species migrate to cathode are
(a) cation (b) anion
(c) both (a) and (b) (d) none of these

104. The number of σ and π bonds present in 1–buten–3–yne are
(a) 6 σ and 4π (b) 6 σ and 6 π
(c) 7 σ and 5 π (d) 7σ and 3 π

105. A solution pH2 has higher acidity than a solution of pH6 is
(a) 100 (b) 1000
(c) 10000 (d) 100000

106. The most stable carbonium ion is
(a) $C_6H_5\overset{+}{C}H_2$ (b) $(CH_3)_3\overset{+}{C}$
(c) $\overset{+}{C}_2H_5$ (d) $(C_6H_5)_3\overset{+}{C}$

107. Dehydration of alcohol is an example of
(a) redox reaction
(b) elimination reaction
(c) substitution reaction
(d) addition reaction

108. Total number of electrons in all the p-orbitals of bromine will be
(a) 7 (b) 9
(c) 15 (d) 17

109. Duralumin is an alloy of
(a) Al and Cu (b) Mg and Cu
(c) Al and Mg (d) Al, Mg, Mn and Cu

110. The metal that does not displace hydrogen from an acid is
(a) Al (b) Ca
(c) Zn (d) Hg

111. The number of moles of oxygen obtained by the electrolytic decomposition of 90 gm water is
(a) 2.5 (b) 5
(c) 7.5 (d) 10

112. A closed container contains equal number of oxygen and hydrogen molecules at a total pressure of 740 mm. If oxygen is removed from the system then pressure will
(a) become double of 740 mm
(b) become half of 740 mm
(c) become $\frac{1}{9}$ of 740 mm
(d) remains unchanged

113. The most acidic oxide is
(a) MgO (b) CaO
(c) Na_2O (d) Al_2O_3

114. Flux is used to remove
(a) silica
(b) metal oxide
(c) silica and metal oxide
(d) impurities from ore

115. The first law of thermodynamics is represented by the equation
(a) $\Delta E = Q - W$ (b) $\Delta E = Q + W$
(c) $W = Q + \Delta E$ (d) $Q = W + \Delta E$

116. Ionization constant of acetic acid is 1.8×10^{-5}. The concentration of H^+ ions in 0.1M solution is
(a) 1.8×10^{-3} M
(b) 1.8×10^{-5} M
(c) 1.3×10^{-3} M
(d) 1.34×10^{-3} M

117. Acetone and acetaldehyde can be identified by
(a) Molisch test (b) bromo form test
(c) Schiffs test (d) iodoform test

118. Difference in $_{17}Cl^{35}$ and $_{17}Cl^{37}$ is of
(a) atomic number
(b) number of neutron
(c) number of electron
(d) number of proton

119. The enthalpy of combustion of C_6H_6 is –3250 kJ. when 0.39 gm of C_6H_6 is burnt in excess of oxygen in an open vessel, the amount of heat evolved is
(a) 8.32 kJ (b) 12.36 kJ
(c) 16.25 kJ (d) 20.74 kJ

120. $C_6H_6Cl_6$ on treatment with KOH produce
(a) C_6H_6
(b) $C_6H_6Cl_4$
(c) $C_6H_3Cl_3$
(d) C_6H_6OH

121. The movement of colloidal particles towards oppositely charged electrodes on passing electricity is known as
(a) Brownian movement
(b) Cataphoresis
(c) Tyndall effect
(d) None of the above

122. $H_2 + Cl_2 \rightarrow 2HCl$, $\Delta H = -194$ kJ. in the above reaction the heat of formation of HCl is
(a) + 97 kJ (b) – 97 kJ
(c) + 107 kJ (d) – 107 kJ

123. The common oxidation state of the elements of lanthanide series is
(a) +1 (b) +3
(c) +4 (d) +6

124. The pH of pure water at 80°C will be
(a) = 7 (b) < 7
(c) > 7 (d) none of these

125. Producer gas is a mixture of
(a) CO + H_2 (b) CO + N_2
(c) H_2 + N_2 (d) CO + CO_2

INTELLIGENCE, LOGIC & REASONING

126. If ZUBIN is coded as ATCHO, then MEHTA will be coded as
(a) NDISB (b) NDHSI
(c) NDGSB (d) NDIUB

127. ADHM : ZWSN : : CFJO : ?
(a) YURM (b) WTPK
(c) XUQL (d) ZXVT

128. Among five boys, Vasant is taller than Manohar, but not as tall as Raju. Jayant is taller than Dutta, but shorter than Manohar. Who is the tallest in the group :
(a) Raju (b) Manohar
(c) Vasant (d) Jayant

129. Engineer : Machine :: Doctor
(a) disease (b) medicine
(c) hospital (d) none of these

130. Q's mother is the sister of R and daughter of S. N is the daughter of R and sister of M. How M is related to S ?
(a) son (b) brother
(c) daughter's son (d) data inadequate

131. Introducing a man, a woman said, "he is the only son of my mother's mother". How is the woman related to man?
(a) mother (b) cousin
(c) niece (d) none of these

Directions (Q. 132 – 133) : *Find the missing number in the series*

132. 1, 2, 3, 5, 7 .....
(a) 9 (b) 8
(c) 10 (d) 13

133. 4, 7, 11, 18, 29, 47,....., 123, 199
(a) 76 (b) 70
(c) 84 (d) 102

Directions (Q. 134 – 135) : *Find out the wrong number in each case.*

134. 49, 56, 64, 71, 81, 90, 100, 110
(a) 56 (b) 64
(c) 71 (d) 81

135. 5, 8, 10, 12, 15, 18, 20, 23
(a) 8 (b) 12
(c) 15 (d) 18

ENGLISH LANGUAGE & COMPREHENSION

Directions (Q. 136 – 139) : *Read the following passage carefully and answer the questions given below in the passage. Certain words/phrases in the passage are given in bold to locate them while answering some of the questions.*

The world of today has achieved much, but for all its declared love for humanity it has based itself for more on hatred and violence than on the virtues that make man human. War is the negation of truth and humanity. Sometimes, war may be unavoidable but its progeny are terrible to contemplate. Not mere killing, for man must die, but the deliberate and persistent propagation of harted and falsehood, which gradually become the normal habits of the people. It is dangerous and harmful to be guided in our life's course by hatreds and aversions, for they are wasteful of energy and limit and twist the mind, and prevent if from perceiving the truth.

136. War is the negation of truth means
- (*a*) wars are evil
- (*b*) wars do not exist
- (*c*) war kills human beings
- (*d*) wars spread and advertise falsehood

137. The world's declared love of humanity is
- (*a*) not to be taken seriously
- (*b*) non existent
- (*c*) false
- (*d*) true

138. According to the author the achievements of the world are not impressive because
- (*a*) there is nothing much to boast of
- (*b*) the world hasn't made any achievement
- (*c*) they are mostly in the field of violence
- (*d*) its love of humanity is a pertence

139. Man should be guided by
- (*a*) materialism
- (*b*) practical wisdom
- (*c*) generous human feelings
- (*d*) scientific discoveries

Directions (Q. 140 – 141) : *In each of the following questions, choose the word with similar meaning of the given word out of the given alternatives.*

140. Hoard
- (*a*) Destroy (*b*) Hide
- (*c*) Divide (*d*) Store

141. Mere
- (*a*) Empty (*b*) Only
- (*c*) Some (*d*) Complete

Directions (Q. 142 – 143) : *In the following sentences, choose the most appropriate preposition.*

142. Students are laughing
- (*a*) at (*b*) in
- (*c*) for (*d*) of

143. The valley was.....the hill.
- (*a*) between (*b*) under
- (*c*) along (*d*) below

Directions (Q. 144 – 145) : *Choose the correct synonyms.*

144. Stand by
- (*a*) support (*b*) attacked
- (*c*) interrupted (*d*) started

145. Sets in
- (*a*) attacked by (*b*) removed
- (*c*) reserved (*d*) begins

Directions (Q. 146 – 150) : *In the following questions, the first and the last parts of the sentences are numbered 1 and 6. The rest part of the sentence is split into four parts and named L, M, N and O. These four parts are not given in their proper order. Read the sentence and findout which of the four combinations is correct.*

146. **1 : The next stop**
L : lying in the centre
M : of a day
N : was a port
O : that our ship halted at
6 : in South Wales.
- (*a*) LMNO (*b*) ONML
- (*c*) ONLM (*d*) NOML

147. **1 : Many people**
L : that the government can always payout money quite easily
M : that the government can only payout
N : seem to think
O : but they forget
6 : that it has received in taxes.
- (*a*) NLOM (*b*) LNMO
- (*c*) OMNL (*d*) MNLO

148. 1 : Above all,
L : in the present age of light reading,
M : it is well if something heavier in costnow and then
N : of reading hastily and thoughtless
O : that is
6 : into the midst of the reading public
(*a*) LNMO (*b*) MONL
(*c*) LONM (*d*) LMNO

149. 1 : Though the exact dimensions
L : involved in the rocket
M : and the precise amount
N : it is clear that such an operation
O : are yet to be ascertained,
6 : could not have been possible without the connivance of officials at various levels.
(*a*) LONM (*b*) MLON
(*c*) NMLO (*d*) OLNM

150. 1 : Inspite of repeated attempts,
L : in the dictionary
M : and finally had to ask his teacher
N : he could not locate
O : the strange-looking world
6 : What is meant?
(*a*) NOLM (*b*) LMNO
(*c*) MNOL (*d*) OLMN

ANSWERS

MATHEMATICS

1. (*b*)	2. (*c*)	3. (*c*)	4. (*c*)	5. (*b*)	6. (*b*)	7. (*a*)	8. (*b*)	9. (*a*)	10. (*c*)
11. (*c*)	12. (*d*)	13. (*a*)	14. (*c*)	15. (*c*)	16. (0)	17. (*b*)	18. (*d*)	19. (*c*)	20. (*b*)
21. (*a*)	22. (*a*)	23. (*c*)	24. (*b*)	25. (*b*)	26. (*b*)	27. (*c*)	28. (*b*)	29. (*b*)	30. (*c*)
31. (*a*)	32. (*c*)	33. (0)	34. (*a*)	35. (*b*)	36. (*a*)	37. (*a*)	38. (*b*)	39. (*b*)	40. (*c*)
41. (*b*)	42. (*c*)	43. (*d*)	44. (*d*)	45. (*a*)					

PHYSICS

46. (*d*)	47. (*c*)	48. (*c*)	49. (*a*)	50. (*c*)	51. (*c*)	52. (*b*)	53. (*d*)	54. (*c*)	55. (*a*)
56. (*d*)	57. (*a*)	58. (*b*)	59. (*c*)	60. (*d*)	61. (*b*)	62. (*b*)	63. (*b*)	64. (*a*)	65. (*a*)
66. (*c*)	67. (*b*)	68. (*d*)	69. (*a*)	70. (*a*)	71. (*b*)	72. (*a*)	73. (*a*)	74. (*a*)	75. (*d*)
76. (*c*)	77. (*d*)	78. (*c*)	79. (*a*)	80. (*b*)	81. (*d*)	82. (*b*)	83. (*c*)	84. (*a*)	85. (*d*)

CHEMISTRY

86. (*b*)	87. (*b*)	88. (*a*)	89. (*b*)	90. (*d*)	91. (*b*)	92. (*c*)	93. (*a*)	94. (*c*)	95. (*c*)
96. (*c*)	97. (*d*)	98. (*a*)	99. (*d*)	100. (*c*)	101. (*d*)	102. (*a*)	103. (*a*)	104. (*d*)	105. (*c*)
106. (*d*)	107. (*b*)	108. (*d*)	109. (*d*)	110. (*d*)	111. (*a*)	112. (*b*)	113. (*d*)	114. (*c*)	115. (*b*)
116. (*d*)	117. (*c*)	118. (*b*)	119. (*c*)	120. (*c*)	121. (*b*)	122. (*b*)	123. (*b*)	124. (*b*)	125. (*b*)

INTELLIGENCE, LOGIC & REASONING

126. (*a*)	127. (*c*)	128. (*a*)	129. (*a*)	130. (*d*)	131. (*c*)	132. (*c*)	133. (*a*)	134. (*c*)	135. (*b*)

ENGLISH LANGUAGE & COMPREHENSION

136. (*d*)	137. (*a*)	138. (*d*)	139. (*c*)	140. (*d*)	141. (*a*)	142. (*a*)	143. (*b*)	144. (*a*)	145. (*d*)
146. (*c*)	147. (*a*)	148. (*a*)	149. (*b*)	150. (*a*)					